## REMARKS

The Office Action of August 3, 2006 has been reviewed and the Examiner's comments carefully considered. The present Amendment amends claims 1, 3, 11, 13, 14, 16, 24 and 26 all in accordance with the originally-filed specification. No new matter has been added. The present amendment also cancels claims 2, 4, 15, 17 and 27-53. Accordingly, claims 1, 3, 5-14, 16 and 18-26 remain in this application, and claims 1 and 14 are in independent form.

Interview of December 1, 2006

The Applicants would like to thank Examiners West and Williams for the courtesies extended to the Applicants' representative during the interview of December 1, 2006. During the interview, the Examiners indicated that a decision on the allowability of a combination of claims 1 and 2 and claims 14 and 15 could not be made until full consideration was given to the arguments presented against the 35 U.S.C. §112, second paragraph rejections of claims 2 and 15. Accordingly, the Examiners indicated that a call would be placed to the Applicants' representative after such a consideration was made to further discuss any steps that may be necessary to place the present application in condition for allowance.

35 U.S.C. §112 Rejections

Claims 2-4, 11-13, 15-17 and 24-26 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention.

Specifically, the Examiner does not understand how the monotonic group delay function, which describes a frequency, can be compared to the acquisition period as required by claims 2 and 15. As described by claims 2 and 15, which have been incorporated into independent claims 1 and 14, respectively, the frequency sweep signal has a monotonic group delay function with a maximum value that is less than the acquisition period. As is

shown in the following figures, labeled Fig. A and Fig. B, the frequency sweep signal is made up of a number of individual signals with a generally sinusoidal shape.

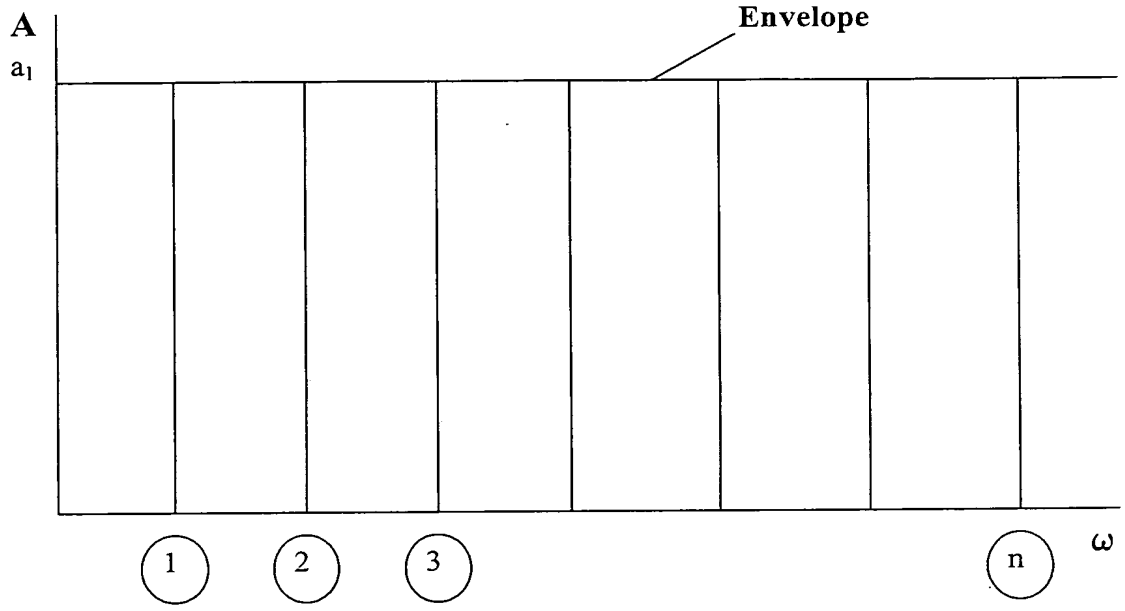



FIG. A

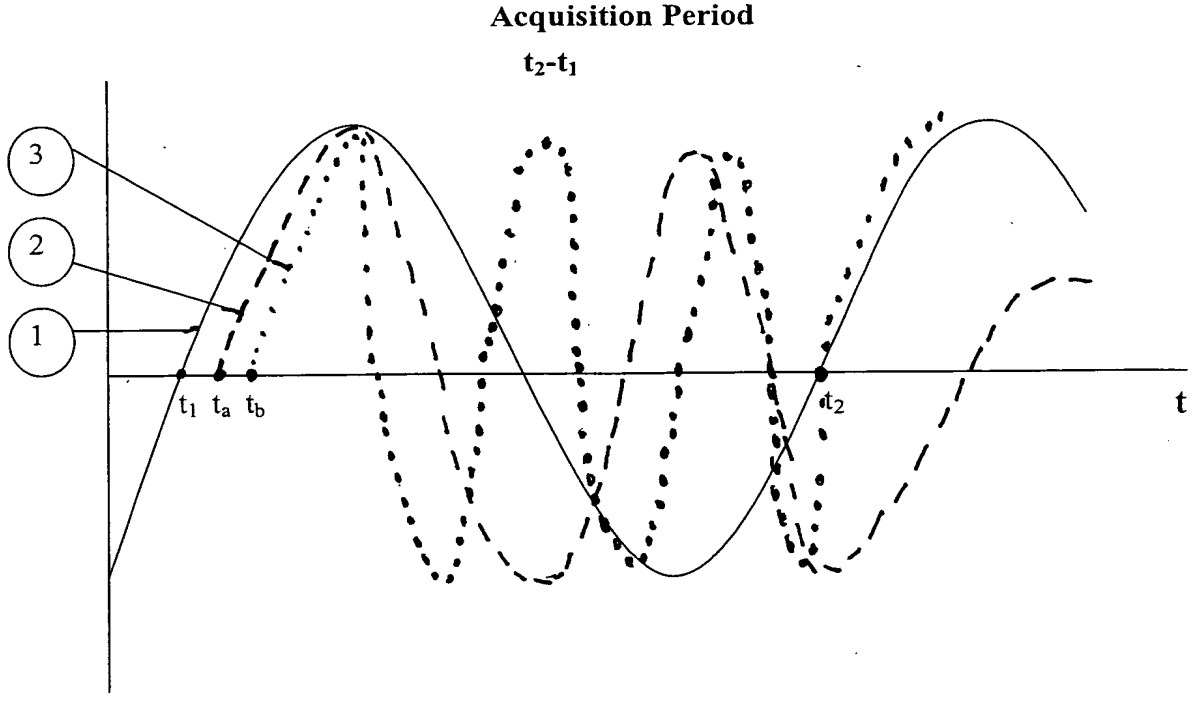



FIG. B

Fig. A illustrates each individual signal by a plot of amplitude against frequency. Thus, the signal numbered 1 has amplitude $a_1$ and frequency $\omega_1$, the signal numbered 2 has amplitude $a_1$ and frequency $\omega_2$, the signal numbered 3 has amplitude $a_1$ and frequency $\omega_3$, and so on. In Fig. A, the envelope which defines the amplitude is simply a straight line and, therefore, each signal has the same amplitude. However, the envelope could be inclined or of curved configuration, thereby causing the amplitude of each of the signals to be different.

Fig. B illustrates signals 1-3 of Fig. A plotted against time. The first signal 1 has a particular frequency (i.e., $\omega_1$) and the acquisition period is shown by the period $t_1$ to $t_2$ in Fig. B. This acquisition period is simply the period in which signal 1 executes one cycle and does not repeat, thereby providing a delay function with a maximum value that is less than the acquisition period. Signal 2 has a frequency ($\omega_2$) that is twice the frequency ($\omega_1$) of signal 1 and is shown by a dashed line, while signal 3 has a frequency ($\omega_3$) that is three times the frequency ($\omega_1$) of signal 1 and is shown by a dotted line. This pattern continues up until the waveform signal n shown in Fig. A. When all of the waveforms shown in Fig. B are added together, the result is the waveform illustrated in Fig. 2 of the disclosure of the present application.

Therefore, the monotonic group delay function is a signal which is made up of a number of waveforms, each of which has a particular amplitude and each has a particular delay as shown by times $t_1$, $t_a$, $t_b$, etc. in Fig. B.

The Examiner is correct in pointing out that the acquisition period relates to time, but the monotonic group delay function has a maximum value that is less than that time. For example, if the acquisition time in which measurements are made is $t_2$-$t_1$, then signal 1 does not repeat within the acquisition period.

Furthermore, the Examiner is also correct in stating that the sweep signal having the monotonic group delay function describes a frequency. However, it is the delay which is compared with the acquisition period which is a unit of time. As stated above, the delay of signal 1 shown in Fig. B is a maximum value which is less than the acquisition time.

In other words, signal 1 does not start to repeat within the acquisition period. As shown in Fig. B, the signal 1 starts to repeat immediately after time $t_2$.

Support for the above explanations and assertions can be found on page 16, line 29 - page 17, line 33 of the originally-filed specification of the present application.

Accordingly, reconsideration and withdrawal of these rejections of claims 2 and 15 (now claims 1 and 14 as amended) is respectfully requested.

Regarding claims 4 and 17, the Examiner contends that the meaning of the term "terfenite" is unclear. Claims 4 and 17 have been cancelled by this Amendment, thus rendering the rejection of these claims moot.

Regarding claims 11, 12, 24 and 25, the Examiner remains unclear regarding which aspect of the signal is "ramped up". The Applicants believe that the above amendments to claims 11 and 24, which clarify that it is the amplitude that is ramped up, overcome the Examiner's indefiniteness rejections. In the response filed May 22, 2006, the Applicants incorrectly argued that it was the frequency that was ramped up. However, the intention of the present invention is that the amplitude of the signal be ramped up effectively from zero such that it gradually increases to its maximum amplitude and then is ramped down at the end of the acquisition period back towards zero. The Applicants apologize for any inconvenience this oversight may have caused the Examiner. Accordingly, the Applicants respectfully request that the rejection to claims 11, 12, 24 and 25 be reconsidered and withdrawn.

Finally, claims 13 and 26 stand rejected because the Examiner contends that it is unclear what is meant by "multiplying the signal". The Applicants believe that the above amendments to claims 13 and 26 overcome the Examiner's indefiniteness rejections. In order to ramp up and ramp down the signal, the signal is effectively multiplied by the ramp function. That is, if the ramp function is zero, then the amplitude of the signal is zero, and if the ramp function is 1, the amplitude of the signal is at its maximum. If the ramp function is between zero and 1, the amplitude of the signal is somewhere between zero and its maximum amplitude. Therefore, the Applicants respectfully request that the rejection to claims 13 and 26 be reconsidered and withdrawn.

35 U.S.C. §102 Rejections

Claims 1, 5-10, 14 and 18-23 stand rejected under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 5,750,884 to Field (hereinafter "the Field patent"). In view of the following remarks, the Applicants respectfully request reconsideration of this rejection.

As defined by amended independent claim 1, the present invention is directed to a rheometer for determining a rheological property of a sample. The rheometer includes a driver for applying an alternating movement to a surface of the sample for causing an alternating movement of the sample; a force measuring device for providing a force signal indicative of the reaction force exerted by the sample on the driver; a displacement measuring device for providing a signal indicative of the alternating movement of the sample; a processor for receiving the force signal and the movement signal to determine the rheological property of the sample; and a signal generator for supplying to the driver a frequency sweep signal having a monotonic group delay function to cause the driver to supply the alternating movement of the sample. Additionally, the frequency sweep signal has a monotonic group delay function with a maximum value less than the acquisition period.

As defined by amended independent claim 14, the present invention is also directed to a method of determining a rheological property of a sample. The method includes the steps of applying by a driver an alternating movement to a surface of the sample for causing an alternating movement of the sample; measuring a force signal indicative of a reaction force exerted by the sample; measuring a signal indicative of the alternating movement of the sample; processing the force signal and the movement signal to determine the rheological property of the sample; and supplying to the driver a frequency sweep signal having a monotonic group delay function to produce the alternating movement of the sample. Additionally, the frequency sweep signal has a monotonic group delay function with a maximum value less than the acquisition period.

The Field patent is directed to a viscometer (100) comprising a signal generator (111) which supplies a signal to a shaker (120). The shaker (120) drives a

shaft (125) with an upper plate (130) attached to a distal end thereof. A lower plate (140) is positioned adjacent to, and substantially parallel to, the upper plate (130) thereby creating a space that may be filled by a fluidic sample (150). The motion of the upper plate (130) is measured by a sensor (180). The lower plate (140) is mounted on a force measuring means (160), which provides an output signal indicative of the force that the fluid sample (150) exerts on the upper plate (130) and the lower plate (140) (see Fig. 1).

The Field patent does not teach or suggest the utilization of a frequency sweep signal having a monotonic group delay function with a maximum value that is less than the acquisition period as required by independent claims 1 and 14. The Examiner refers to the description of signal generator (111) at column 6, lines 2-5 of the Field patent as discussing a frequency sweep signal having a group delay which is monotonic. However, this portion of the Field patent only refers to the waveform of the vibration being the sum of several sinusoids with different frequencies, a sinusoid with varying frequency, single or reversing ramps, step or impulse functions, or a random function of time. There is no disclosure or suggestion in the Field patent of a monotonic group delay function. The Examiner further contends that the signal generator (111) of the Field patent is capable of supplying many different types of waveforms, and the intended use of the signal generator of the present invention does not structurally distinguish it from the Field patent.

The Applicants respectfully disagree with this assertion. A signal generator which is programmed or controlled to supply a particular type of waveform is in effect structurally different from a signal generator which supplies another type of waveform. In other words, a device programmed to operate in one particular mode is in effect structurally different from a device which is programmed to operate in a different mode. The present invention is somewhat equivalent to a computer or processor type invention in which the actual hardware, namely the computer *per se*, might be of known design, but when programmed to perform a particular function, effectively produces a new structural component. Accordingly, while the Field patent does disclose a signal generator, the nature of the signals produced by this signal generator is quite different than those of the present invention. As mentioned above, the Field patent fails to teach or suggest a signal generator

that applies a signal having a monotonic group delay function with a maximum value that is less than the acquisition period.

Therefore, since the Field patent does not disclose or suggest a signal generator for producing the signal now defined in amended claim 1, the Applicants believe that the present invention is structurally distinguished from the Field patent.

Regarding independent claim 14, the Examiner further contends that the Field patent supplies the driver with a frequency sweep signal having a group delay which is monotonic. On page 7 of the final Office Action, the Examiner also contends that the Field patent teaches a ramp function for the vibration signal which is considered to be equivalent to a monotonic group delay. The Applicants respectfully disagree. The Examiner refers to column 6, lines 2-5 of the Field patent. This portion of the Field patent provides a number of examples of waveforms which can be used. Based on the examples which are given, it is clear that the Field patent is merely generalizing waveforms and is not concerned with any particular type of waveform for any particular reason. The closest reference to a waveform in the Field patent when compared to that defined in claims 1 and 14 is the reference to a waveform in the form of a sum of several sinusoids with differing frequencies. The monotonic group delay function of the present invention does have waveforms of different frequencies, but there is no indication in the Field patent that those several sinusoids which are summed, in fact, do have a delay, as is shown in Fig. B above (by reference to $t_1$, $t_a$, $t_b$).

Additionally, the Field patent does not teach or suggest a frequency sweep signal having a monotonic group delay function with a maximum value less than the acquisition period.

The monotonic group delay function with a maximum value less than the acquisition period overcomes significant problems in prior art devices and methods and, in particular, the problems disclosed in the Field patent. As is explained in some detail in the present specification, harmonics from non-linearities (i.e. distortions) are distributed in a well defined way rather than randomly across the frequency spectrum and, therefore, can be corrected for in the data processing. Furthermore, intermittent external noise sources are confined to the frequencies during which they occur rather than being spread across the entire

spectrum of the signal. Thus, the result is a considerable improvement in signal to noise ratio and, therefore, better processing and results. Since the Field patent does not disclose or suggest a generator which produces the signal now defined in amended independent claims 1 and 14, and in view of the significance of that signal as discussed above, the Applicants believe that these claims are allowable over the Field patent.

For the foregoing reasons, the Applicants believe that the subject matter of independent claims 1 and 14 is not anticipated by the Field patent. Reconsideration of the rejection and allowance of claims 1 and 14 are respectfully requested.

Claims 5-10 and 18-23 depend from and add further limitations to independent claims 1 and 14 or a subsequent dependent claim and are believed to be patentable for the reasons discussed hereinabove in connection with independent claims 1 and 14. Reconsideration of the rejection and allowance of claims 5-10 and 18-23 are respectfully requested.

35 U.S.C. §103 Rejections

Claims 3, 11, 16 and 24 stand rejected under 35 U.S.C. §103(a) for obviousness based upon the Field patent. In view of the following remarks, the Applicants respectfully request reconsideration of this rejection.

Claims 3, 11, 16 and 24 depend from and add further limitations to amended independent claims 1 and 14. The Field patent was discussed hereinabove in connection with amended independent claims 1 and 14. Therefore, claims 3, 11, 16 and 24 are believed to be patentable for the reasons discussed hereinabove in connection with amended independent claims 1 and 14. Reconsideration of the rejection and allowance of claims 3, 11, 16 and 24 are respectfully requested.

Allowable Subject Matter

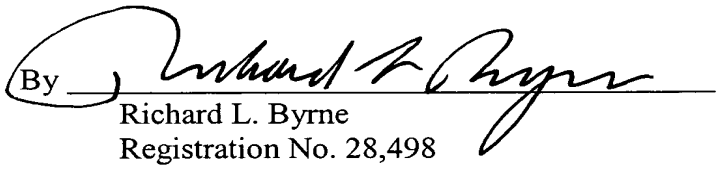
The Applicants would also like to thank the Examiner for indicating that claims 12 and 25 would be allowable if rewritten in independent form and to overcome the indefiniteness rejections, as discussed above. Furthermore, the Applicants would like to note

that claims 13 and 26, while rejected under 35 U.S.C. §112, second paragraph, were not given a prior art rejection; however, the Examiner did not list these claims as allowable subject matter along with claims 12 and 25.

Based on the foregoing amendments and remarks, reconsideration of the rejection and allowance of pending claims 1, 3, 5-14, 16 and 18-26 are respectfully requested.

Respectfully submitted,

THE WEBB LAW FIRM

By 

Richard L. Byrne
Registration No. 28,498
Attorney for Applicants
700 Koppers Building
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219
Telephone: 412-471-8815
Facsimile: 412-471-4094
E-mail: webblaw@webblaw.com